



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
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Via email and USPS

September 30, 2014

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U.S. Department of Energy
AM for Sustainability and Infrastructure
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RE: Explanation of Significant Differences, Concurrence Letter, Lawrence Livermore National Laboratory, Livermore Site, Livermore, California, September 2014

Dear Phil,

The U.S. Environmental Protection Agency (EPA) has concurred on the Explanation of Significant Differences, Lawrence Livermore National Laboratory ("LLNL/Main Site" or "Site"), Livermore, California, dated September 2014. Please contact me if you have questions at (415) 972-3167.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Bain".

Andrew Bain
Remedial Project Manager
Air Force and DOE Section

Cc by email: Ariel Robertson, DOE
Jacinto Soto, DTSC
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Final
Explanation of Significant Differences for Land
Use Controls
Lawrence Livermore National Laboratory
Livermore Site

September 2014



Environmental Restoration Department

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Table of Contents

1. Introduction.....	1
2. Site History, Contamination and Remedy Selected in the ROD	1
2.1. Site History and Contamination.....	1
2.2. Remedy Selected in the ROD	3
2.2.1. Groundwater.....	3
2.2.2. Unsaturated Zone	4
3. Description of the Significant Differences and the Basis for the Differences.....	4
3.1. Basis.....	5
3.2. Description.....	5
3.2.1. Livermore Site Land Use Control Objectives	6
3.2.2. Livermore Site Land Use Controls.....	7
3.2.3. Livermore Site Land Use Controls Status	13
4. Support Agency Comments	16
5. Public Participation.....	16
6. Affirmation of the Statutory Determinations.....	17
7. References.....	18
8. Acronyms.....	20

List of Figures

- Figure 1. Location of the LLNL Livermore Site.
- Figure 2. Map delineating areas of institutional controls.
- Figure 3. Responsibilities prior to construction or soil and debris disturbing activities.
- Figure 4. Procedures upon discovery of contaminated soil and debris during excavation, construction, or demolition projects.

List of Tables

- Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site.
- Table 2. Land Use Control Monitoring Checklist for the Livermore Site.

Appendices

- Appendix 1. Site Evaluation Request Form

Attachments

- Attachment A. Identification and Screening of Institutional Controls for the Lawrence Livermore National Laboratory Livermore Site
- Attachment B. Responses to Regulatory Comments on the Draft Explanation of Significant Differences for Institutional Controls

**We would like to acknowledge the contributions of the
following individuals:**

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1. Introduction

On August 5, 1992, the Record of Decision (ROD) (United States [U.S.] Department of Energy [DOE], 1992) was signed, documenting the final cleanup plan for the Lawrence Livermore National Laboratory (LLNL) Livermore Superfund Site in Livermore, California (“Livermore Site” or “Site;” see Figure 1). Significant changes to the cleanup plan selected in the ROD must be documented in an Explanation of Significant Differences (ESD), and the public notified of the ESD per Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA), and pursuant to 40 Code of Federal Regulations (CFR) Section 300.435 (c)(2)(i) (Fed. Reg. Vol. 55, No. 46 [March 8, 1990]).

This ESD has been prepared to incorporate land use controls (LUCs) into the Livermore Site remedy selected in the ROD, and thus minimize the risk of human exposure to contaminated soil or groundwater from the Site. The Livermore Site encompasses both the property occupied by LLNL (“Facility Property”) and property to the south and west adjacent to it which is affected, or potentially affected, by contamination from the Facility Property. The Site history, contamination, and remedy selected in the ROD are described in Section 2. A discussion of LUCs and the reasoning for adding them to the Remedy are presented in Section 3. The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency for this ESD. The EPA, the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the California Department of Toxic Substances Control (DTSC) oversee the LLNL Livermore Site and have commented on this ESD. All regulatory comments and DOE responses are presented in Section 4. This ESD has been placed in the LLNL repositories as part of the Administrative File, per 40 CFR 300.825(a)(2). The locations and hours of the LLNL repositories and public participation in the ESD are discussed in Section 5. This ESD was prepared according to EPA guidance (EPA, 1999).

2. Site History, Contamination, and Remedy Selected in the ROD

2.1. Site History and Contamination

In 1942, the U.S. Navy converted the land area which comprises the vast majority of the Facility Property (Figure 1) from agricultural use. The Navy used that land area as a flight-training base and for aircraft assembly, repair, and overhaul until 1946. Solvents, paints, and degreasers were routinely used during this period. Between 1946 and 1950, the Navy housed the Reserve Training Command at the Facility Property. In 1950, the Navy allowed occupation of the Facility Property by the Atomic Energy Commission (AEC), which formally received transfer (i.e., took ownership) of the property in 1951. Under the AEC, the Facility Property was used as a weapons design and basic physics research laboratory. In 1952, LLNL and the Facility Property were established as a separate part of the University of California Radiation Laboratory. Responsibility for LLNL and the Facility Property was transferred to the Energy, Research, and Development Administration in 1975. In 1977, responsibility for LLNL and the Facility

Property was transferred to DOE¹ for the foreseeable future. Between 1984 and 1992, DOE added property as a buffer zone to the west and north of the original U.S. Navy property, forming the current Facility Property, as depicted in Figure 1.

LLNL continues its national security mission today. The Lawrence Livermore National Security, Limited Liability Corporation (LLNS) currently operates LLNL under contract on behalf of the National Nuclear Security Administration, a semi-autonomous agency under the DOE. The Facility Property is located approximately three miles east of downtown Livermore, California, and comprises approximately 800 acres (Figure 1). Land immediately north of the Facility Property is zoned for industrial use. To the west, the land has been developed for residential use (“Residential Property”). Sandia National Laboratories, California, (“SNL”) is located on the property south of the Facility Property (“Sandia Property”). (The Residential Property and Sandia Property collectively are referred to as the “Adjacent Property.”) The area east of the Facility Property is zoned for agriculture and is currently used as pasture land (DOE, 2005).

Initial hazardous materials releases occurred in the mid- to late-1940s when most of the Facility Property was used as the Livermore Naval Air Station (Thorpe et al., 1990). There is also evidence that localized spills, unlined landfills, and leaking tanks and impoundments contributed volatile organic compounds (VOCs), fuel hydrocarbons (FHCs), metals, and tritium to the groundwater and unsaturated sediments in the post-Navy era. By 1987, a plume of VOCs had migrated about 2,200 feet west of the current Facility Property. VOCs had also migrated to the south of the Facility Property, beneath the Sandia Property. These historical operations and the resulting groundwater contamination by hazardous substances, as defined in Section 101(14) of CERCLA, led to placement of the Livermore Site on the EPA National Priorities List in 1987. In August 1987, the RWQCB adopted Site Cleanup Order No. 87-108 for various parts of the Facility Property. In June 1988, this order was superseded by Site Cleanup Order No. 88-103 which established a schedule for investigations and remediation of contamination from the Facility Property consistent with CERCLA’s requirements.

LLNL operates as a multi-program, continuing mission site, with a focus on stockpile stewardship, as well as research and development, nuclear counterterrorism and nuclear nonproliferation. As such, DOE utilizes the Facility Property as an industrial site and, given the ongoing nature of LLNL’s national security mission, DOE reasonably anticipates that the Facility Site will continue to be utilized as an industrial site for the foreseeable future. Due to the nature of LLNL’s mission, DOE also will continue to prohibit general public access to any portion of the Facility Property that may pose a risk of exposure to contamination, and continue to prohibit recreation areas for employees in areas posing any risk of exposure to contamination. The risks associated with contaminants in soil and groundwater necessitate LUCs for the Facility Site.

Contaminants present in groundwater under the Facility Property and Adjacent Property, and in soil on the Facility Property include TCE, PCE, chloroform, carbon tetrachloride, 1,1-DCE, benzene, tritium, and inorganic substances, such as chromium, lead, nitrate, sulfate, and manganese. As described in the ROD, potential exposure pathways to contaminated groundwater

¹ DOE succeeded the Energy, Research, and Development Administration in 1977, which in turn had succeeded the Atomic Energy Commission in 1975. Ownership of the Facility Property passed along with the succession of one governmental entity to the next.

exist by present and future human receptors on the Facility Property and Adjacent Property from the use of contaminated water from wells located there. For domestic water uses, the potential exposure pathways are ingestion of drinking water, inhalation of volatile substances, and entry through the skin. For irrigation uses, the potential exposure pathways are inhalation of volatilized chemicals from sprinklers, and ingestion of foods from crops or home gardens irrigated with water containing the chemicals of concern. Under the no-remediation scenario, the maximum additional cancer risk is two in one thousand (2×10^{-3}) for a lifetime exposure to contaminants in water from a potential monitor well drilled 250 feet west of LLNL. The HI calculated for this scenario is 1.

Potential exposure pathways to contaminated subsurface soil by present and future human receptors on the Facility Property also exist from activities that disturb the soil, such as subsurface excavation or drilling, and by present and future human receptors on the Facility Property and Adjacent Property, from the migration of contaminants in subsurface soil to groundwater that increase the concentrations of groundwater contamination above MCLs. (Contaminated surficial soils on the Facility Property were evaluated as a potential medium of concern. However, a screening analysis of the risks resulting from potential exposure to contaminated surficial soils on the Facility Property has shown these risks are insignificant, and surficial soils therefore are not a medium of concern for the LLNL Site.) Unsaturated soil cleanup levels are based on the mobility of specific contaminants in the sediment at the Facility Property.

The Livermore Site history, contamination found during the investigations, and cleanup progress are described in more detail in the Livermore Site Remedial Investigation Report (Thorpe et al., 1990), the Feasibility Study (Isherwood et al., 1990), the ROD (DOE, 1992), the Remedial Action Implementation Plan (RAIP) (Dresen et al., 1993a), Remedial Design Report No. 1 (Boegel et al., 1993), and the LLNL Ground Water Project, 2012 Annual Report (Buscheck et al., 2013).

2.2. Remedy Selected in the ROD

Based on the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, DOE selected the following remedial alternatives for the Livermore Site in the ROD: 1) Alternative No. 1 for groundwater (pumping and surface treatment by ultraviolet [UV]/oxidation and air stripping); and 2) Alternative No. 1 for the unsaturated zone (vacuum-induced venting and surface treatment of vapors by catalytic oxidation). EPA concurred with DOE's selection, and the DTSC and the RWQCB agreed with the selection. Treatment technologies have since been modified per previous ESDs as described below.

2.2.1. Groundwater

The primary purpose of the selected groundwater remedy is to contain volatile organic compounds (VOCs) and prevent further downgradient migration of contaminated groundwater beyond the boundaries of the Facility Property, and to reduce the concentrations of contaminants in groundwater after cleanup to levels below the designated cleanup levels, Maximum Contaminant Levels (MCLs). The selected remedy will address all groundwater contaminated with VOCs in excess of MCLs and will assure that ARARs for individual VOCs, fuel hydrocarbons (FHCs), lead, chromium, and tritium will be achieved.

The selected groundwater remedy involves pumping water at multiple locations within the groundwater plume. Eighteen initial pumping locations were identified in the ROD (DOE, 1992) and six additional pumping locations were identified in the RAIP (Dresen et al., 1993a). Several other pumping locations have since been added to ensure complete hydraulic capture of the plume and/or to expedite cleanup. DOE/LLNS currently maintain 92 groundwater pumping wells and 28 groundwater treatment facilities (Buscheck et al., 2013).

In 1997, an ESD was approved to document a change from an ultraviolet/hydrogen peroxide (UV/H₂O₂) and air stripping groundwater treatment system to air stripping only at Treatment Facilities A and B (Berg et al., 1997a). Metals discharge limits were also approved in 1997 by the regulatory agencies through an ESD (Berg et al., 1997b). All groundwater treatment facilities conform to these standards when discharging treated groundwater. In 2000, an ESD for Trailer 5475 groundwater remediation was approved to document a change to allow groundwater containing VOCs and tritium above its MCL to be treated for VOCs at the surface, and then return the tritiated water to the subsurface to decay naturally (Berg, 2000).

The ROD identified the use of contaminated well water as the only potential exposure pathway for present and future human receptors on the Adjacent Property. The magnitude and extent of the VOC plume on the Adjacent Property has diminished during the past 20 years of active pump-and-treat remediation. PCE is currently the only VOC in Adjacent Property groundwater with concentrations exceeding MCLs, and this is limited to three monitor wells where concentrations range from 5 to 6 micrograms per liter (µg/L). Depth to water is greater than 50 feet below ground surface (ft-bgs) in this area.

2.2.2. Unsaturated Zone

Soil vapor treatment on the Facility Property is required by the ROD to prevent migration from the unsaturated zone to the saturated zone (i.e., groundwater) of those contaminants that would result in concentrations in groundwater above an MCL. The selected remedy for the unsaturated zone involves using vacuum-induced venting to extract and treat contaminant vapors from the unsaturated sediments. In 1993, an ESD was approved to document a change to granular activated carbon (GAC) from catalytic oxidation for treatment of vapor extracted from the unsaturated zone by vacuum-induced venting (Dresen et al., 1993b).

Unsaturated sediments beneath the Adjacent Property are not impacted by VOCs. ROD risk assessment results indicate that VOCs volatilized from soil to outdoor air do not pose a hazard to human receptors working on the Facility Property. Subsequent indoor air sampling and vapor intrusion pathway analysis indicate that soil gas does not pose a hazard to human receptors working in structures on the Facility Property.

3. Description of the Significant Differences and the Basis for the Differences

In reviewing the Fourth Five-Year Review for the Livermore Site (McKereghan et al., 2012), EPA identified that the ROD did not include LUCs for either the Facility Property or the Adjacent Property impacted by contamination from the Facility Property (see EPA's concurrence Letter, 9/28/2012), and that the remedy therefore is not protective in the long-term. To ensure that the remedy for the LLNL Site is protective in the long-term in relation to all potential

receptors at the Livermore Site (i.e., both on the Facility Property and the Adjacent Property), EPA requested that DOE/National Nuclear Safety Administration identify and evaluate potential LUCs and, as appropriate, modify the remedy by incorporating them. EPA and the DOE/NNSA subsequently agreed that an Explanation of Significant Differences (ESD) would be an appropriate mechanism for modifying the remedy. This ESD describes the LUCs that DOE/NNSA has evaluated and will incorporate into the remedy selected in the ROD.

3.1. Basis

The Feasibility Study for the Livermore Site (Isherwood et al., 1990) indicated the potential for receptor exposure to contaminated soil on the Facility Property and the risk of exposure to contaminated groundwater originating from the Facility Property. These risks will remain until concentrations of soil and groundwater contaminants have been reduced to meet cleanup standards. Until that time, effective LUCs are essential to protect human health and the environment, and achieve the ROD's RAO of preventing future human exposure to contaminated groundwater and soil (see Appendix A). Although LUCs already are in place for the Facility Property in the form of physical barriers, security guards, and engineered controls, the ROD does not reference them and they therefore are not part of the selected remedies. Even if these existing LUC measures already were part of the selected remedies, additional measures would be necessary to ensure against human exposure to contamination, ensure the integrity of the selected remedies both on the Facility Property or the Adjacent Property, and adequately address long-term protectiveness. This ESD therefore describes those already existing LUC measures (including institutional controls) and newly identified LUCs that DOE/NNSA is incorporating into the remedies selected in the ROD. These measures will control the risk of exposure to contaminated groundwater or soil until cleanup is complete, and protect the integrity and effectiveness of current or future monitoring and treatment facilities. LUCs will be maintained until the concentration of hazardous substances in the soil and groundwater are at such levels to allow for unrestricted use and exposure, although they may be modified with EPA and DTSC approval if circumstances so warrant.

3.2. Description

LUCs are restrictions or controls that are implemented to protect human health and the environment at a contaminated site. Land use controls include both Institutional Controls ("ICs"), and engineering controls. ICs are a subset of LUCs which EPA (U.S. EPA, 2012) defines as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a response action. ICs are typically designed to work by limiting land or resource use or by providing information that helps modify or guide human behavior at a site. ICs typically are divided into four categories:

1. Proprietary controls
2. Governmental controls.
3. Enforcement and permit tools.
4. Information devices.

Proprietary controls are generally created pursuant to state law to prohibit activities that may compromise the effectiveness of a remedial action or restrict activities or future resource use that may result in unacceptable risk to human health or the environment. Governmental controls impose restrictions on land use or resource use, using the authority of a government entity. Federal landholding agencies, such as DOE, possess the authority to enforce institutional controls on their property. At active federal facilities, such as the Facility Property, governmental controls may be addressed in master plans, facility construction review processes, and digging permit systems. Enforcement and permit tools are legal tools that limit certain site activities or require the performance of specific activities. Information devices provide information or notifications to local communities about site-related contamination.

LUCs also include engineering controls, such as depressurization systems, capping and containment systems, and security barriers, fencing and security guards, as means to protect human health by containing the hazard and/or preventing exposure to contamination. In this document, the term “LUCs” is used to encompass both ICs and engineering controls.

LUCs are necessary to prevent human receptor exposure to contaminants in soil (on Facility Property) and groundwater (on Facility Property and Adjacent Property) currently above the MCLs. LUCs are more effective if they are layered or implemented in series with each other. Layering can involve using different types of LUCs at the same time to enhance the protectiveness of the remedy. DOE analyzed and selected several layered LUCs to include as a component of the Livermore Site Remedy to preclude the completion of exposure pathways (Attachment A). The selected LUCs were evaluated by DOE against the Remedial Action Objectives listed in the LLNL Livermore Superfund Site ROD (U.S. DOE, 1992). DOE then further screened the LUCs based on applicability, effectiveness, implementability, and cost. The LUCs that passed the screening were retained and combined to form the LUC component added to the Livermore Site Remedial Alternatives selected in the ROD through this ESD. The selected LUCs are described below.

Section 3.2.1 describes the Livermore Site LUC objectives and the risks necessitating these controls. Section 3.2.2 discusses, by RAO, the specific LUCs to be incorporated in the Livermore Site remedies, including the responsible entities and implementation mechanisms. The status of the Livermore Site LUCs and their necessary lifespan are summarized in Section 3.2.3. Table 1 presents a description of: (1) the Livermore Site LUC objectives, and duration, (2) the risk necessitating the controls, and (3) the specific LUCs and implementation mechanisms used to prevent exposure to contamination. Figure 2 depicts a map indicating the geographical location where the LUCs will be implemented and maintained.

3.2.1. Livermore Site Land Use Control Objectives

The Land Use Control Objectives and the risk drivers for the Livermore Site include:

1. **Risk Driver** – Contaminant concentrations in groundwater on the Facility Property and Adjacent Property exceed cleanup standards.

LUC Performance Objectives:

- Prevent water-supply use/consumption of contaminated groundwater on the Facility Property and protect the integrity of the remedy and monitoring systems until groundwater cleanup standards are met (Section 3.2.2.1).

- Prevent water-supply use/consumption of contaminated groundwater on the Adjacent Property and protect the integrity of the remedy and monitoring systems until groundwater cleanup standards are met (Section 3.2.2.2).
2. **Risk Driver** – Potential exposure to contaminants at depth in subsurface soil.

LUC Performance Objective:

- Control excavation activities on the Facility Property to prevent human exposure to contaminants in subsurface soil and protect the integrity of the remedy and monitoring systems until soil cleanup standards are met. (Section 3.2.2.3).

3. **Risk Driver** – Potential exposure to contaminated environmental media.

LUC Performance Objectives:

- Prevent transfer of all or portions of the Facility Property for residential or unrestricted land use with unmitigated contamination that could cause potential harm under such use scenario until cleanup levels which allow for unlimited use/unlimited exposure are achieved (Section 3.2.2.4).
- Prohibit the development and use of property for residential housing, elementary and secondary schools, childcare facilities and playgrounds until cleanup levels which allow for unlimited use/unlimited exposure are achieved (Section 3.2.2.4).

3.2.2. Livermore Site LUCs

Below, the specific LUCs to be incorporated in the Livermore Site remedies are discussed by RAO, including the responsible entities and implementation mechanisms.

3.2.2.1. Prevent Water-Supply Use/Consumption Of Contaminated Groundwater on Facility Property Until Groundwater Cleanup Standards Are Met

This ESD modifies the selected remedy by including the following LUCs to prevent water-supply use/consumption of contaminated groundwater on LLNL Facility Property until the concentration of hazardous substances in the groundwater are at such levels to allow for unrestricted use and exposure:

- *Engineering Controls:*

DOE currently maintains a fence around both the entire Facility Property and the adjacent Sandia Property although, in the future, the fence line may be shifted to allow public access to a structure on an uncontaminated portion of the Facility Property. The fence is patrolled by a full-time security force to prevent unauthorized intrusion, thus restricting access to the Facility Property and Sandia Property. There are three access points that are staffed by armed security guards whenever they are open. Access is limited to individuals performing work at the Facility and the Sandia Property. This precludes the possibility of any outside party constructing any wells or diverting any existing well facilities to use or consume contaminated groundwater without DOE's knowledge and permission. In addition, all existing wells of whatever type are locked, and the security of the locking mechanism is checked quarterly, as well as every time a well is accessed.

- *Governmental Control: LLNL Dig Permit Process*

There are no existing or planned water-supply wells on the Facility Property. It is possible that LLNL will use treated water extracted for environmental cleanup, but not for potable

purposes, and always in full compliance with applicable laws, regulations, and San Francisco Bay Regional Water Quality Control Board guidance. The construction of any well at LLNL requires soil disturbing activities. No such soil disturbance is allowed on the Facility Property without a soil excavation permit approved by the LLNL Facilities and Infrastructure Documentation and Permits Group. Prior to a decision to grant of any such permit, the LLNL Environment, Safety and Health (ES&H) Team Environmental Analyst (EA) must conduct a preconstruction site evaluation. To initiate this process, a site Evaluation Request Form (see Appendix 1) is filled out and given to the LLNL ES&H Team EA with a description of the project attached, including project location, and excavation footprint and depth. The LLNL ES&H Team EA conducts an evaluation of the proposed project location. The evaluation includes:

- Review of LLNL Environmental Restoration Department (ERD) historical source investigation.
- Review of Environmental Functional Area site evaluation documents.
- Review of current and past operations, and pre-existing soil analytical data.
- Visual inspection to evaluate the project site for possible contamination.

If this evaluation indicates there will be unacceptable environmental consequences such as use or exposure to contaminated groundwater or contaminated soil, the dig permit will not be issued until and unless the plan of work is amended to resolve such consequences. If no such consequences are apparent, EA will then determine whether soil sampling of the project location is required. If so, the LLNL ES&H Team EA and ES&H technician prepare and implement the sampling plan. The LLNL ES&H Team EA evaluates the results. If a potential for contaminant exposure is identified through any of these reviews, prior to issuing the excavation permit, the ES&H Team, including the LLNL ES&H Team EA, representatives from health and safety disciplines, and LLNL Waste Management will work with the Responsible Individual/project manager proposing the project to relocate the well to ensure groundwater contaminants would not be drawn into the well. Thus, this process ensures that water-supply wells are not constructed in locations where groundwater contamination exists or where soil contaminants exist which could migrate into groundwater.

3.2.2.2. Prevent Water-Supply Use/Consumption Of Contaminated Groundwater on Adjacent Property Until Groundwater Cleanup Standards Are Met

This ESD modifies the selected remedy by including the following ICs to prevent water-supply use/consumption of contaminated groundwater on Adjacent Property until groundwater cleanup standards are met:

- *Governmental Control: Alameda County Well Permitting Process*
- *Governmental Control: City of Livermore and Underground Service Alert Notification*
- *Information Tool: Livermore Site Groundwater Monitoring Program*
- *Information Tool: Federal/State/County Site Registries*
- *Information Tool: Notification to Owners and Community Working Group Meetings*
- *Governmental Control: Restrictions on Well Drilling at Sandia National Laboratory California Property*

Governmental Control: Alameda County Well Permitting Process

Groundwater in the Livermore Valley Groundwater Basin is managed by Zone 7 under authority from California Water Code Section 30000 (County Water District). Zone 7 interfaces with LLNL and state, county, and local agencies to assure the groundwater basin is protected. The construction, repair, reconstruction, destruction or abandonment of wells within Zone 7 is currently regulated by Alameda County General Ordinance Code, Chapter 6.88. The Alameda County ordinance (6.88.040) prohibits the drilling or alteration of a well in the City of Livermore without a permit from the Zone 7 Water Agency. Zone 7 well construction and destruction permit requirements adhere to the Department of Water Resources' (DWR's) California Well Standards (Bulletins 74-81 and 74-90). Under the DWR's California Well Standards, all water wells are required to be located an adequate horizontal distance from known or potential sources of pollution and contamination, including biological and chemical sources. Zone 7 also requires that aquifer isolation is maintained during the drilling and well construction process as a special condition when a permit is granted within the LLNL IC area. Zone 7 maintains a Toxic Sites Surveillance (TSS) Program to document and track release sites within the basin that pose potential threat to drinking water. LLNL regularly shares groundwater monitoring data and maps of the VOC plume distribution as detailed in the description of the Livermore Site Groundwater monitoring program in Section 3.2.2.2. That information is included in the TSS database used by Zone 7 staff to help assess the potential threat posed by a given proposed well when considering permit requirements and, whenever necessary, to deny a permit application if human health is threatened. LLNL also requests a TSS review from Zone 7 prior to constructing any wells outside the Facility Property.

As depth to groundwater is approximately 70 feet below ground surface, a licensed contractor would be required to drill/access the groundwater. All well construction, alteration, destruction, or abandonment must be performed by an individual with a C-57 Water Well Contractor's License. All well drillers are required to file a completion report (Well Completion Report Form - DWR 188) with the DWR (California Water Code 13750.5-13751). Alameda ordinance requires the completion report also be filed with Zone 7. Individuals with a C-57 Water Well Contractor's License must follow California DWR regulations and local standards. Additionally, the completion report documents methods used for sealing off surface or contaminated waters and methods used for preventing contaminated waters of one aquifer from mixing with the waters of another aquifer. Failure to comply with any provision of the Health and Safety Code or Water Code, including but not limited to those listed above, is a misdemeanor. The threat of criminal sanctions serves as a significant deterrent to the unlicensed drilling of wells. These measures will control the risk of exposure to contaminated groundwater until cleanup is complete, and help protect the integrity and effectiveness of the groundwater remedy.

Governmental Control: City of Livermore and Underground Service Alert

LLNL operates the TFA-West pipeline under an easement from the City of Livermore. This pipeline is located underground in the public right-of-way, and transports contaminated groundwater from offsite extraction wells on the Residential Property to the groundwater treatment facilities on the Facility Property. Therefore, LLNL is required by law (California Government Code Section 4216) to maintain membership in Underground Service Alert of Northern/Central California (USA-North). Parties performing excavation work are required by

law to inform USA-North of planned excavation. USA-North informs the owner of the utility, who is required by law to field-mark the excavation site within two working days to show the location of the utility. Excavators who damage a subsurface installation are required to report the incident to the owner, and can determine ownership through USA-North. Violation of this law by excavators carries civil and criminal penalties. LLNL has registered the TFA-West pipeline with USA-North, and will continue to comply with its legal duty to provide any necessary location updates that result from changes to the pipeline or additional underground installations associated with its environmental remediation program. Through this mechanism, the TFA-West pipeline and any future pipelines will be adequately identified prior to any excavation activities that could potentially damage the pipelines and result in the release of contaminated groundwater.

Information Tool: Federal/State/County Site Registries

Zone 7 maintains a Toxic Sites Surveillance (TSS) Program to document and track release sites within the basin that pose potential threat to drinking water. Information tracked in the Zone 7 TSS Program is gathered from state, county, and local agencies, as well as from Zone 7's well permitting program and the California Water Resources Control Board's GeoTracker website. The information held in this database is used by Zone 7 staff to help assess the potential threat posed by a given site when determining whether to grant or deny permits. A report is generated biennially to update the status of the sites in the program. This report is submitted to the Zone 7 Board and is available to the public on Zone 7's website.

Information Tool: Livermore Site Groundwater Monitoring Program

The Livermore Site Environmental Restoration Program installed and monitors over 600 groundwater monitoring wells, located both on Facility Property and Adjacent Property, to track groundwater cleanup progress. Sample frequency is determined by an algorithm approved by the EPA, DTSC and the RWQCB, and included in LLNL's approved compliance monitoring program. Data collected is used to confirm site conditions and update modeling. The Livermore Site Groundwater Monitoring Program is able to detect any adverse changing conditions, which would include any physical destruction or damage to DOE infrastructure and/or improper private conduct that adversely impacts or improperly uses the groundwater. The results of the monitoring are published in the Livermore Site Annual Ground Water Project Report and Quarterly Self-Monitoring Reports. These reports, in addition to other environmental remediation documents, are available to the public and neighboring property owners through the environmental repositories and are available for viewing at the Livermore Public Library and the LLNL Discovery Center, as well as on the LLNL Public Affairs Office maintained website, <https://www-envirinfo.llnl.gov/>. The groundwater monitoring program also provides copies of the annual reports to EPA, DTSC and the RWQCB. Going forward, the reports will include a description of the LUCs as an appendix.

LLNL also maintains a working relationship with the Zone 7 Water Agency and continually shares data regarding basin groundwater levels and contaminant plume locations and concentrations. Remediation progress data is entered into GeoTracker by LLNL on a quarterly basis, and Zone 7 has access to all data. In addition, the Livermore Site Annual Ground Water Project Report is provided to Zone 7. Zone 7 incorporates this information in the TSS Program and uses the data to help assess the potential threat posed by a given site when determining whether to grant or deny permits.

Information Tool: Notification to Owners and Community Working Group Meetings

A number of informational devices are implemented to prevent water-supply use or consumption of contaminated groundwater on Adjacent Property. The Livermore Site Annual and Quarterly Reports contain updates on the status of contaminant plumes, treatment facilities, and remediation progress both on Facility Property and Adjacent Property. These reports, in addition to other environmental remediation documents, are available to the public and neighboring property owners through the environmental repositories and are available for viewing at the Livermore Public Library and the LLNL Discovery Center, as well as on the LLNL Public Affairs Office maintained website, <https://www-envirinfo.llnl.gov/>. These reports are also submitted to the Zone 7 Water Agency, as described above. Near Neighbor Disclosure Letters, also found on the website, discuss the off-Facility Property groundwater contamination and contact information. The Near Neighbor Disclosure Letters also inform the recipients of the availability of LLNL environmental documents and their online and physical locations. These letters are mailed to the residences in the area shown on Figure 2 on an annual basis by LLNL Public Affairs for any year in which any contamination from the Facility Property exists outside the Facility and Sandia Properties. In addition, LLNL has recently formalized its existing practice to hold public meetings to brief and engage the public whenever changes to or additions to remedies are proposed or become necessary. These meetings are announced in the local newspaper and past attendees are notified by electronic mail or posted letters.

Government Control: Restrictions on Well Drilling at Adjacent Sandia National Laboratory, California (SNL) Property

DOE owns the adjacent Sandia Property and directs the work and actions of the contractor responsible for the management and operations of SNL on the Sandia Property pursuant to a contract with DOE. DOE will, under its management and operating contract for SNL, include a contractual requirement that SNL personnel will not conduct, nor will DOE authorize, well drilling on the Sandia Property for any purpose except environmental monitoring unless and until DOE environmental staff reviews the proposed drilling, determines that it would not adversely impact LLNL's remedial actions or create additional risk of exposure to groundwater contamination, and approves the proposal. In addition, the Sandia Property is subject to an internal dig permit process, analogous to the LLNL Dig Permit Process. DOE will require that the SNL dig permit process incorporate a requirement that the Sandia environmental staff consult the LLNL ERD staff, through their respective DOE/NNSA Field Offices, if the proposed permit location is near an area of historic groundwater contamination. These measures will control the risk of exposure to contaminated groundwater or soil until cleanup is complete, and protect the integrity and effectiveness of the groundwater remedy.

3.2.2.3. Control Excavation Activities on Facility Property To Prevent Worker Exposure To Contaminants In Subsurface Soil Until It Can Be Verified That Concentrations Do Not Pose An Exposure Risk To Onsite Workers

This ESD modifies the selected remedy by including the following land use controls to control excavation activities to prevent onsite worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers:

- *Engineering Control:*

DOE maintains and regularly patrols a fence around both the Facility Property and the adjacent Sandia Property. The fence is manned by a full-time security force to prevent

unauthorized intrusion, thus restricting access to the Facility Property and Sandia Property. There are three access points that are staffed by armed security guards whenever they are open. Access is limited to individuals performing work at the Facility and the Sandia Property. This precludes the possibility of any outside party conducting any soil excavation or disturbance without DOE's knowledge and permission.

- *Governmental Control: Facility Property Dig Permit Process*

A soil excavation permit approved by the LLNL Facilities and Infrastructure Documentation and Permits Group is required prior to any excavation work on Facility Property. As part of the soil excavation permit process, a preconstruction site evaluation is required for any soil or debris disturbing activities. As soon as it is determined that soil or debris are to be disturbed at a project site, the Responsible Individual/project manager is required to notify the LLNL Environment, Safety and Health (ES&H) Team Environmental Analyst (EA) to initiate a preconstruction site evaluation. To document the request, a Site Evaluation Request Form (see Appendix 1) is filled out and given to the LLNL ES&H Team EA with a description of the project attached, including project location, and excavation footprint and depth. The LLNL ES&H Team EA evaluates the proposed project location to determine whether sampling of the project location is required.

The evaluation includes:

- Review of LLNL ERD historical source investigation.
- Review of Environmental Functional Area site evaluation documents.
- Review of current and past operations, and pre-existing soil analytical data.
- Visual inspection to evaluate the project site for possible contamination.

If sampling of the project location is required, the LLNL ES&H Team EA and ES&H technician prepare and implement the sampling plan. The LLNL ES&H Team EA evaluates the results and, if a potential for contaminant exposure is identified, recommends methods to ensure that the original sampling adequately defined the hazards and that the necessary controls are identified and implemented prior to the start of work. These controls are identified through conditions to the soil excavation permit and are implemented by the Responsible Individual/project manager. The ES&H Team, including the LLNL ES&H Team EA, representatives from health and safety disciplines, and LLNL Waste Management will also work with the Responsible Individual/project manager proposing the project to determine if the work plans can be modified to avoid areas of contamination. Figure 3 summarizes the responsibilities of the Responsible Individual/project manager, the LLNL ES&H Team EA, ERD, and other key individuals.

During excavation or soil or debris disturbing activities such as well drilling, a Controlled Area (approximately 50 feet radius exclusion zone) is established with regulated access. If potentially contaminated soil or debris is unexpectedly discovered during excavation or soil or debris disturbing activities, the Responsible Individual/project manager is required under LLNL internal procedures to stop work and immediately notify the LLNL ES&H Team EA and the ERD so that the material can be evaluated. Samples are gathered to properly classify the soils and/or debris. After evaluating the results, the proper method of handling any contaminated material is implemented. Figure 4 summarizes the procedures that the Responsible Individual/project manager is required to follow during excavation, construction, or demolition to ensure that any contaminated soil or debris is properly managed.

3.2.2.4. Prohibit Transfer Of All Or Portions Of The Facility Property With Unmitigated Contamination That Could Cause Potential Harm Under Residential Or Unrestricted Land Use

This ESD modifies the selected remedy by including the following ICs to prohibit transfer of Facility Property with unmitigated contamination that could cause potential harm under residential or unrestricted land use scenarios:

- *Enforcement Tool: Livermore Site Federal Facilities Agreement (FFA)*
- *Land Record Restrictions: Environmental Restrictive Covenants*
- *Land Record Restrictions: State Designation of Land as Hazardous Use Property*

The Livermore Site Federal Facility Agreement (FFA) provides that DOE must comply with the requirements of CERCLA §120(h) if it decides to transfer any of the Facility Property. In the event that a portion or all of the Facility Property is transferred in the future to a non-federal entity, DOE will implement deed restrictions per CERCLA 120(h), and also will execute a land use covenant at the time of transfer in compliance with Title 22 CCR, Division 4.5, Chapter 39, Section 67391.1(a), (d), (e) and (i). This provision requires DTSC to ensure that appropriate use limitations are imposed at the time of transfer through a land use covenant on the property to be transferred when hazardous materials, wastes, or substances remain at levels which are not suitable for unrestricted use of the property.

Development will be restricted to industrial land usage. These restrictions will be crafted to prohibit the development and use of Facility Property for residential housing, elementary and secondary schools, childcare facilities and playgrounds until cleanup levels which allow for unlimited use/unlimited exposure are achieved. These restrictions will remain in place until and unless a risk assessment is performed in accordance with then current U.S. EPA risk assessment guidance and the DOE, U.S. EPA, DTSC, and RWQCB agree adequately shows that no unacceptable risk for residential or unrestricted land use is present.

LLNL Livermore Facility Property remains an active DOE facility, and DOE has not proposed any plans to transfer any Livermore Facility Property land for residential, unrestricted, or non-DOE industrial land use during the five-year review period. Therefore, it has not been necessary to execute a land use covenant or deed restrictions. These institutional controls will be implemented if and when the property or a portion thereof is transferred in accordance with the requirements of the Livermore Site ROD as modified by this ESD, CERCLA 120(h), and Title 22 CCR Division 4.5, Chapter 39, Section 67391.1(a), (d), (e) and (i).

3.2.3. Livermore Site Land Use Controls Status

DOE will implement, maintain, monitor, report on and enforce LUCs for the Facility Property and Sandia Property. DOE will perform those actions related to LUC activities described in this ESD. For the Adjacent Property, DOE will monitor and report on the implementation, maintenance, and enforcement of the LUCs, and coordinate with federal, state, and local governments and owners and occupants of Adjacent Property subject to the LUCs. DOE will provide notice of the groundwater contamination and the LUCs referenced in this ESD to the federal, state and local governments involved at the Site and, as described in sub-section 3.2.2.2, the owners and occupants of the properties subject to the use restrictions and LUCs. DOE will provide the initial notice within 90 days of publication of notice of this ESD. Subsequent notifications will be provided on an annual basis or, if conditions warrant, as

necessary to ensure protection of human health and the integrity of the remedy. DOE remains responsible for ensuring the remedy remains protective of human health and the environment. DOE will fulfill its responsibility and obligations under CERCLA and the NCP as it implements, maintains, and reviews the selected remedy. Although DOE may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the DOE shall retain ultimate responsibility for remedy integrity.

The Livermore Site land use controls described above in Section 3.2.2 are currently implemented or, on issuance of this ESD, will be implemented by DOE, LLNL, and Zone 7, as applicable. Livermore on- and off-Facility Property use or consumption of contaminated groundwater will continue to be prevented, with the exception of onsite industrial use post-treatment, until groundwater cleanup standards are met. Excavation activities will continue to be controlled to prevent onsite worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers. The transfer of lands with unmitigated contamination that could cause potential harm under residential or unrestricted land use will continue to be prohibited, unless the requirements of CERCLA § 120(h), 42 U.S.C. § 9620(h), and Title 22, California Code of Regulations Section 67391.1, are met. DOE shall not modify or terminate LUCs, implementation actions, or modify land use without approval by EPA, DTSC and the RWQCB. DOE shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.

Monitoring of the environmental use restrictions and controls will be conducted annually by DOE. The monitoring results will be included in a separate report or as a section of another environmental report such as an annual monitoring report, if appropriate, and provided to the USEPA, DTSC and the RWQCB. The annual monitoring reports will be used in preparation of the Five Year Review to evaluate the effectiveness of the remedy.

The annual monitoring report, submitted to USEPA, DTSC and the RWQCB by DOE, will evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. The annual evaluation will address whether the use restrictions and controls referenced above were communicated in any deed(s) issued, whether the owners and state and local agencies were notified of the use restrictions and controls affecting the property, and whether use of the property has conformed to such restrictions and controls. The Land Use Control Monitoring Checklist is presented in Table 2.

Any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs at the Livermore Site will be addressed by DOE as soon as practicable, but in no case will the process be initiated later than 10 days after DOE becomes aware of the breach. In addition, DOE will notify EPA, DTSC and the RWQCB, as soon as practicable but no longer than 10 days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs. DOE will notify EPA, DTSC and the RWQCB regarding how DOE has addressed or will address the breach within 10 days of sending them notification of the breach.

To ensure the on-going effectiveness of the LUCs described in this ESD, DOE will implement them through the use of its contracting authority. DOE's contracting officers will issue contractually binding written direction to the contractors requiring them to: 1) follow the LUC procedures and protocols (e.g., the dig permit process); and 2) secure permission from DOE before changing the procedures and protocols. The procedures and protocols, in turn, will be implemented through the management/operating contractor's internally published procedure/protocol materials, in particular, the Environmental Safety and Health manual, and work process instructions. If the management/operating contractor proposes to change the procedures and protocols, DOE will evaluate whether the proposed change is warranted and would affect implementation of the LUCs and, if so, will notify EPA. DOE will notify EPA, DTSC and the RWQCB, 45 days in advance of any proposed changes to the internal procedures that would affect the LUCs described in this ESD.

DOE will notify EPA, DTSC and the RWQCB 45 days in advance of any proposed land use changes that are inconsistent with land use control objectives or the selected remedy. DOE also will provide notice to EPA, DTSC and the RWQCB at least six (6) months prior to any transfer or sale of the Facility Property or Sandia Property so that EPA, DTSC and the RWQCB can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective ICs. If it is not possible for DOE to notify EPA, DTSC and the RWQCB at least six months prior to any transfer or sale, then the DOE will notify them as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to ICs. In addition to the land transfer notice and discussion provisions above, DOE further agrees to provide EPA, DTSC and the RWQCB with similar notice, within the same time frames, as to federal-to-federal transfer of property. DOE will provide a copy of executed deed or transfer assembly to EPA, DTSC and the RWQCB.

Each transfer of fee title from the United States will include a CERCLA § 120(h)(3) covenant which will have a description of the residual contamination on the property and the environmental use restrictions, expressly prohibiting activities inconsistent with the performance measure goals and objectives.

The environmental restrictions are included in a section of the CERCLA § 120(h)(3) covenant that the United States is required to include in the deed for any property that has had hazardous substances stored for one year or more, or known to have been released or disposed of on the property. Each deed will also contain a reservation of access to the property for DOE, EPA, DTSC and the RWQCB, and their respective officials, agents, employees, contractors, and subcontractors for purposes consistent with DOE's Installation Restoration Program ("IRP") or the Federal Facility Agreement ("FFA"). The deed will contain appropriate provisions to ensure that the restrictions continue to run with the land and are enforceable by DOE.

Concurrent with the transfer of fee title from the DOE to transferee, information regarding the environmental use restrictions and controls will be communicated in writing to the property owners and to appropriate state and local agencies to ensure such agencies can factor such conditions into their oversight and decision-making activities regarding the property.

Title 22, California Code of Regulations Section 67391.1(a), (d), (e) and (i), require that appropriate use limitations are imposed at the time of transfer to a non-federal entity through a land use covenant on the property to be transferred when hazardous materials, wastes, or substances remain at levels which are not suitable for unrestricted use of the property. DOE recognizes this authority as a relevant and appropriate requirement for the purposes of this ESD. No other ARARs changes have resulted from this ESD.

4. Support Agency Comments

See Attachment B.

5. Public Participation

Pursuant to 40 CFR Section 300.435(c)(2)(i) and EPA (1999), a public comment period is not required for an ESD. However, a notice of availability and brief description are to be published in a major local newspaper. A notice of availability with a brief description of the ESD was published in *The Independent, Tri-Valley Herald*, and *Valley Times* on July 18, 2013.

This ESD will be placed in the LLNL repositories for interested members of the public to review. One repository is located at the Livermore Public Library – Civic Center, 1188 South Livermore Avenue. Library hours are Monday through Thursday, 10:00 a.m. to 9:00 p.m.; Friday, 10:00 a.m. to 6:00 p.m., Saturday, 10:00 a.m. to 5:00 p.m.; and Sunday 12:00 to 6:00 p.m. The second repository is at the LLNL Discovery Center on Greenville Road. Discovery Center hours are Tuesday through Friday, 1:00 to 4:00 p.m., and Saturday 10:00 a.m. to 2:00 p.m. The Administrative Record, which contains all documents that form the basis for the Livermore Site cleanup plan, can be accessed at the LLNL.

6. Affirmation of the Statutory Determinations

DOE believes that the remedy remains protective of human health and the environment in the short term and, with incorporation of the LUCs described in this Explanation of Significant Differences, will be protective in the long-term as well, meet all ARARs as specified in the NCP, Section 300.430(f)(1)(ii)(B)(1) and (2), comply with CERCLA §121, and be cost effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practical for this site.



Angeles Herrera

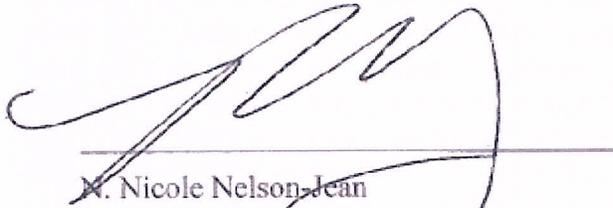
Assistant Director, Federal Facilities Cleanup Branch

Superfund Division

U. S. Environmental Protection Agency, Region IX

9/30/14

Date



N. Nicole Nelson-Jean

Acting Manager

National Nuclear Security Administration

Livermore Field Office

9/30/14

Date

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8. Acronyms

AEC	Atomic Energy Commission
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EA	Environmental Analyst
EIS/EIR	Environmental Impact Statement/ Environmental Impact Report
EPA	Environmental Protection Agency
ERD	Environmental Restoration Department
ESD	Explanation of Significant Differences
ES&H	Environment, Safety & Health
FAA	Federal Facilities Agreement
FHC	Fuel hydrocarbon
GAC	Granular activated carbon
gpm	Gallons per minute
H ₂ O ₂	Hydrogen peroxide
HI	Hazard Index
ICs	Institutional Controls
IRP	Installation Restoration Program
LLNL	Lawrence Livermore National Laboratory
LUC	Land Use Control
MCLs	Maximum Contaminant Levels
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
RAIP	Remedial Action Implementation Plan
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendment and Reauthorization Act
SNL	Sandia National Laboratory
TCE	Trichloroethene

TSS	Toxic Sites Surveillance (Program)
U.S.	United States
UV	Ultraviolet
VOCs	Volatile organic compounds
µg/L	Micrograms per liter

Figure 1

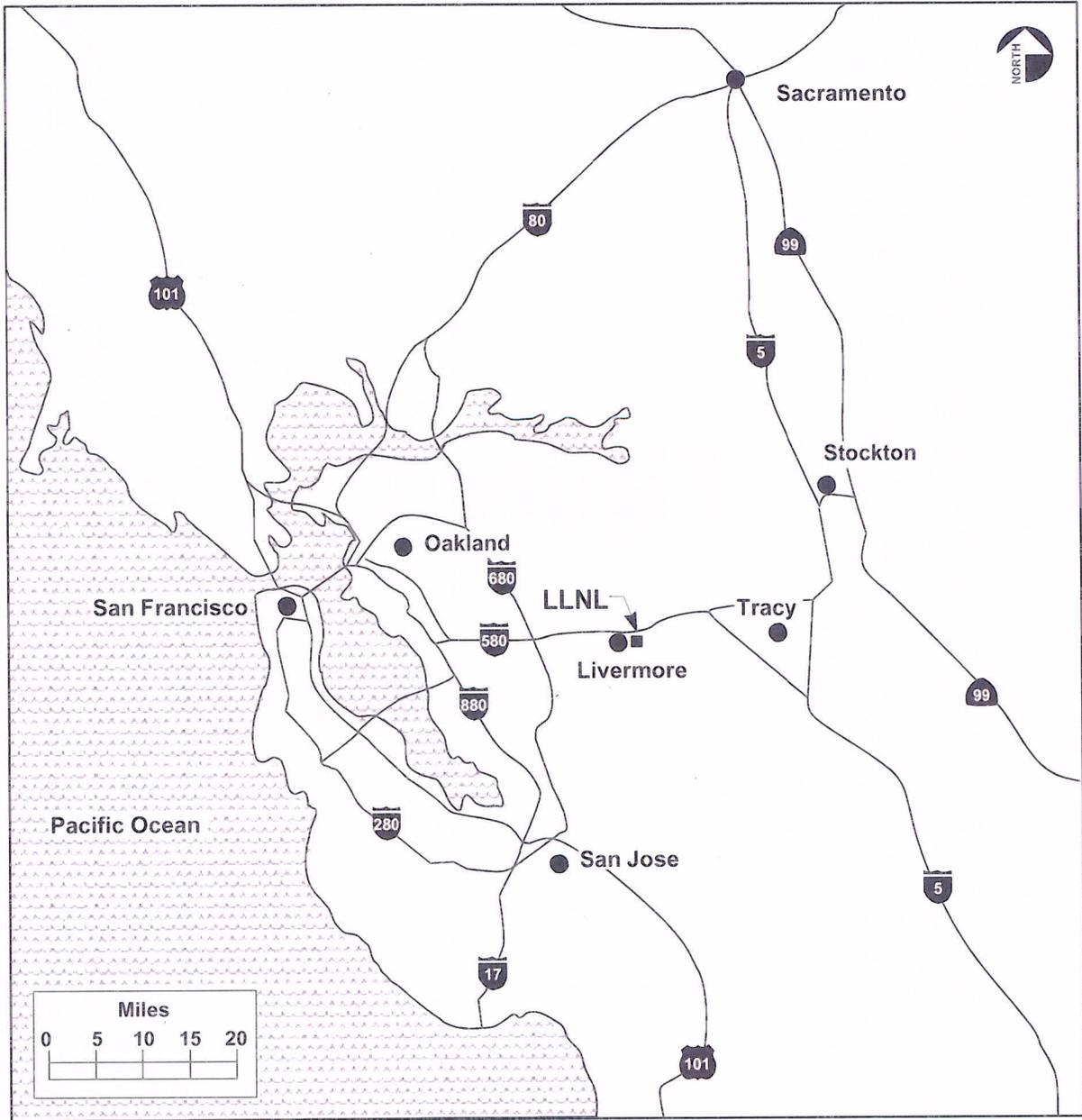


Figure 1. Location of the LLNL Livermore Site.

Figure 2

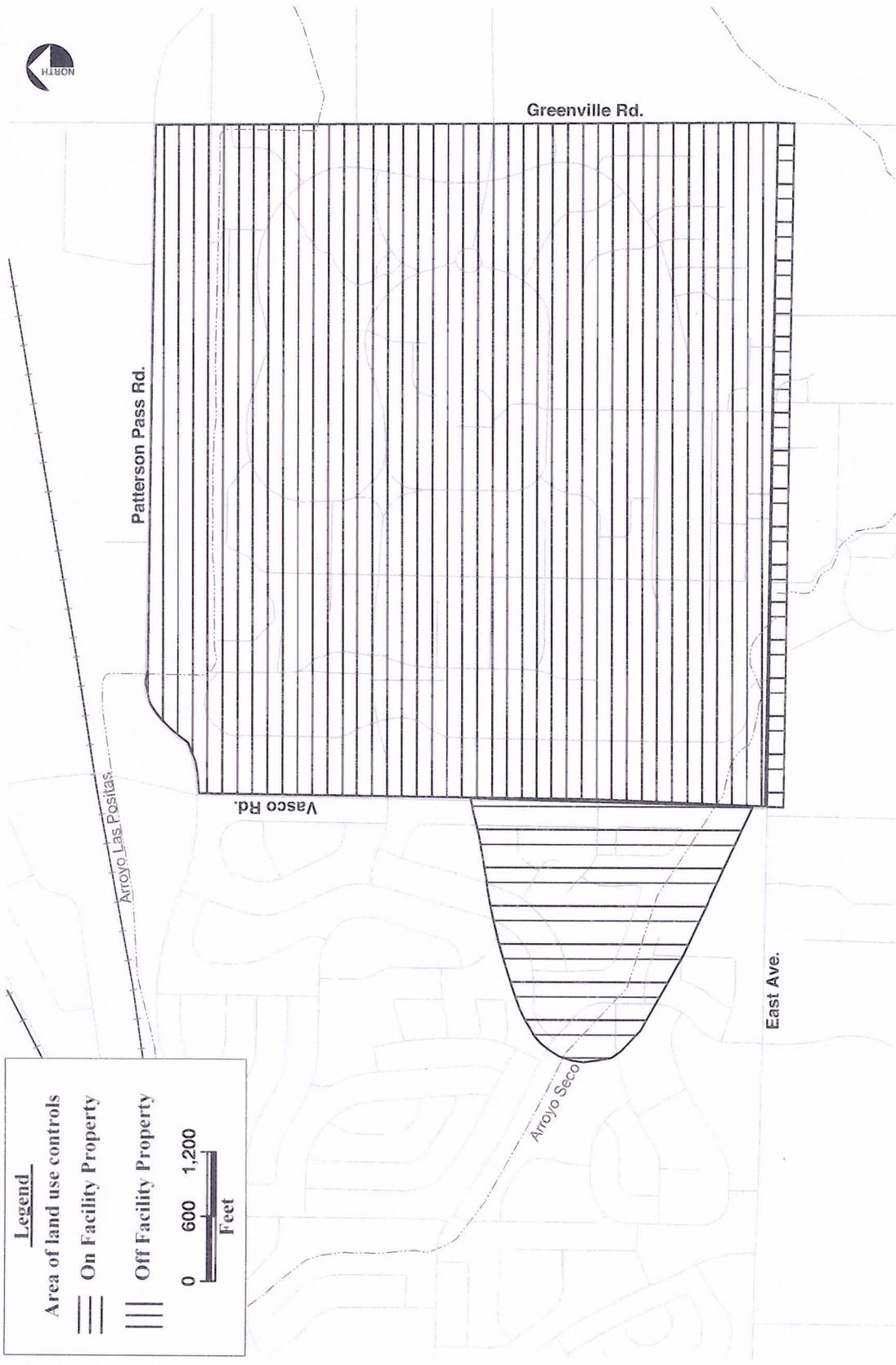


Figure 2. Map delineating areas of land use controls.

Figure 3

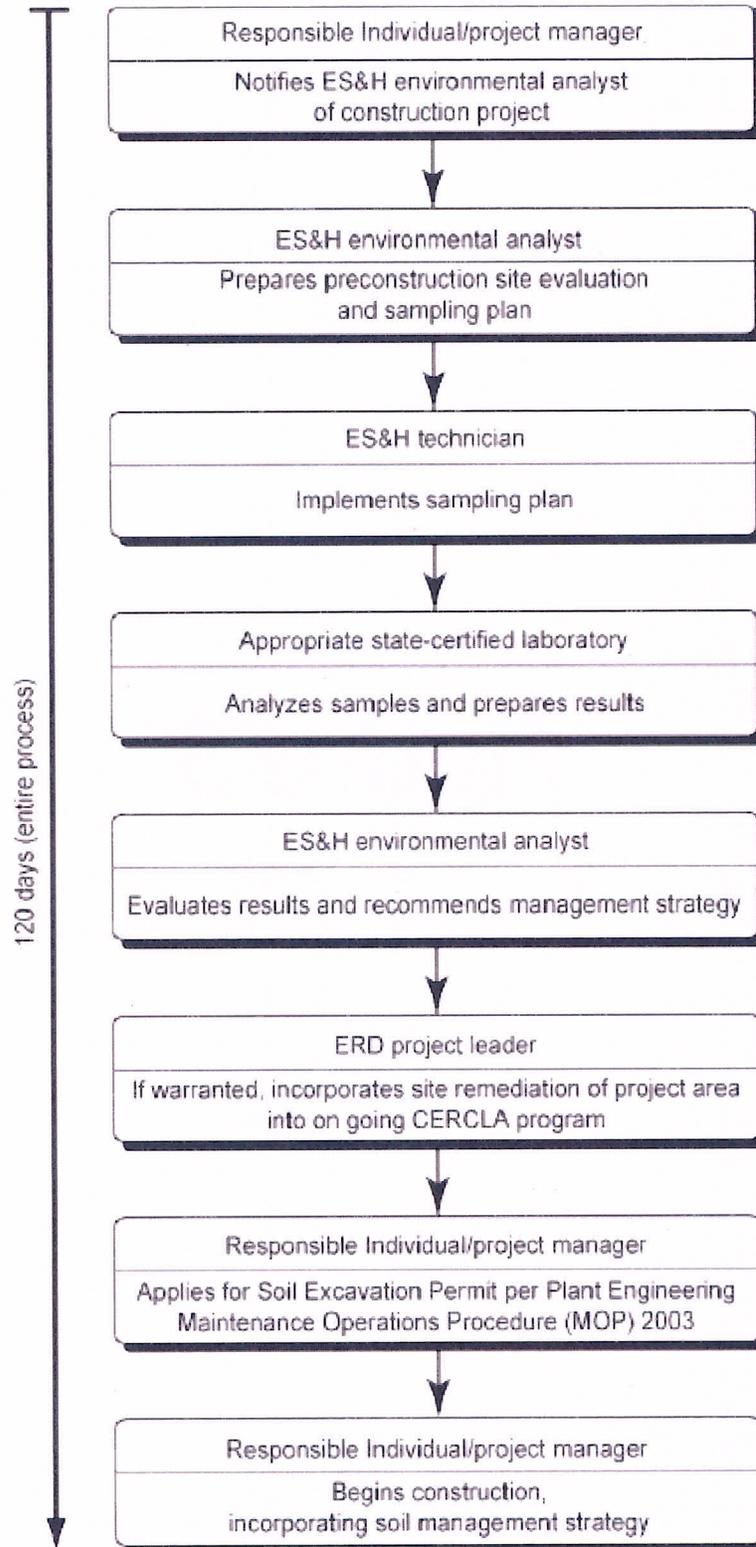


Figure 3. Responsibilities prior to construction or soil and debris disturbing activities

Figure 4

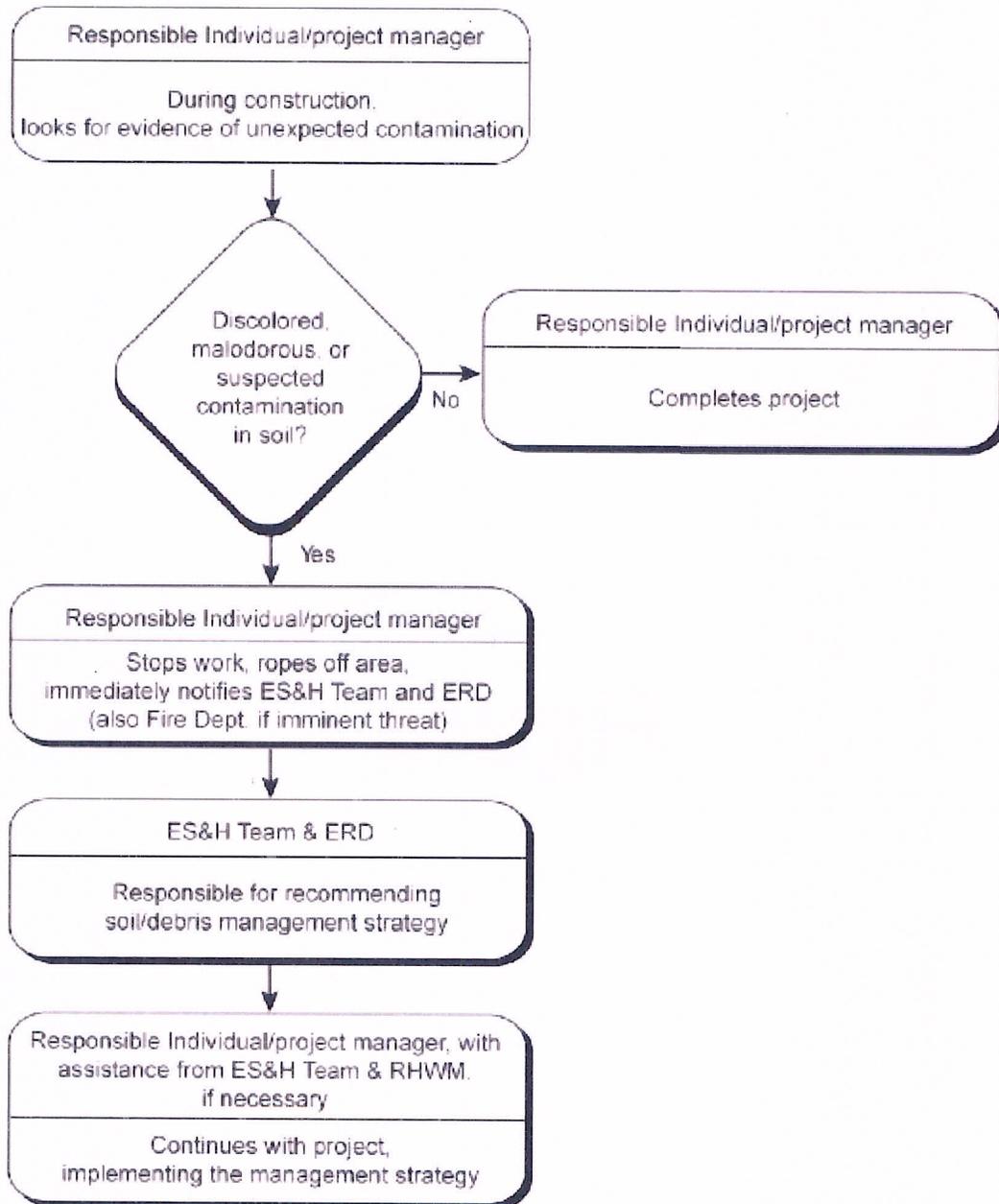


Figure 4. Procedures upon discovery of contaminated soil and debris during excavation, construction, or demolition projects

Table 1

Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site.

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
Prevent water-supply use/consumption of contaminated ground water on Facility Property until ground water cleanup standards are met.	VOC concentrations in ground water on Facility Property exceed cleanup standards.	DOE currently maintains a fence around the Livermore Site and the adjacent Sandia Property, preventing outside parties from constructing any wells or diverting any existing well facilities to use or consume contaminated ground water without DOE's knowledge and permission. There are no existing or planned onsite water-supply wells at the Livermore Site. It is possible that LLNL will use treated water extracted for environmental cleanup, but not for potable purposes, and always in full compliance with applicable laws, regulations, and San Francisco Bay Regional Water Quality Control Board guidance. The construction of any well at LLNL requires soil disturbing activities. No such soil disturbance is allowed on the Facility Property without a fully approved LLNL soil excavation permit. The permit process includes an evaluation of the proposed well location by the LLNL Environmental Analyst to determine if the proposed new water-supply well is located in an area of ground water contamination. If it is determined that the proposed water-supply well location is in a ground water contamination area, the Environmental Analyst works with the LLNL entity proposing the well installation and the LLNL Environmental Restoration Department to relocate the well to ensure ground water contaminants would not be drawn into the well before the Excavation Permit is issued.
Prevent water-supply use/consumption of contaminated ground water on Adjacent Property until ground water cleanup standards are met.	VOC concentrations in ground water on Adjacent Property exceed cleanup standards.	Groundwater in the Livermore Valley Groundwater Basin is managed by Zone 7 under authority from California Water Code Section 30000 (County Water District). The Alameda County ordinance (6.88.040) prohibits the drilling or alteration of a well in the City of Livermore without a permit from the Zone 7 Water Agency. Zone 7 interfaces with LLNL and state, county, and local agencies to assure the ground water basin is protected, and maintains a Toxic Sites Surveillance (TSS) Program to document and track release sites within the basin that pose potential threat to drinking water. The Livermore Site Environmental Restoration Program installed and monitors over 600 ground water monitoring wells, located both on Facility Property and Adjacent Property, to track ground water cleanup progress. The Livermore Site Ground Water Monitoring Program is able to detect any adverse changing conditions, which would include any physical destruction or damage to DOE infrastructure and/or improper private conduct that adversely impacts or improperly uses the ground water. The results of the monitoring, updates on the status of contaminant plumes and remediation progress at the

Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site (continued).

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
Control excavation activities on Facility Property to prevent worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers.	Potential exposure to VOCs at depth in subsurface soil.	<p>Livermore Site and data collected from on- and offsite monitor wells are published in the Livermore Site Annual Ground Water Project Report and Quarterly Self-Monitoring Reports. These reports, in addition to other environmental remediation documents, are provided to the federal and state regulatory agencies and Zone 7, and available to the public and neighboring property owners through the environmental repositories and are available for viewing at the Livermore Public Library and the LLNL Discovery Center, as well as on the LLNL Public Affairs Office maintained website https://www-enviroinfo.llnl.gov/. Near Neighbor Disclosure Letters, also found on the website, discuss the offsite ground water contamination and contact information. In addition, LLNL periodically holds Community Working Group meetings to discuss the status of contaminant plumes and remediation progress with community members.</p> <p>DOE will incorporate as a condition of the management and operating contract for SNL a provision that DOE will not conduct or authorize well drilling on the Sandia Property for any purpose except environmental monitoring unless and until DOE environmental staff reviews the proposed drilling and determines that it would not adversely impact LLNL's remedial actions or create additional risk of exposure to groundwater contamination. In addition, the Sandia Property is subject to an internal dig permit process, analogous to the LLNL Dig Permit Process. DOE will require that the SNL dig permit process incorporate a requirement that the Sandia environmental staff consult the LLNL ERD staff if the proposed permit location is near an area of historic groundwater contamination.</p>
Control excavation activities on Facility Property to prevent worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers.	Potential exposure to VOCs at depth in subsurface soil.	<p>DOE maintains and regularly patrols a fence around both the Facility Property and the adjacent Sandia Property, precluding the possibility of any outside party conducting any soil excavation or disturbance without DOE's knowledge and permission. All proposed excavation activities at Livermore Site require an Excavation Permit. In addition, a Site Evaluation Request Form is required for all soil disturbing projects. These processes include an evaluation of the proposed project location by the LLNL Environmental Analyst to determine if the proposed project site is located in an area of contamination. If a potential for contaminant exposure is identified, LLNL Environmental Health & Safety (ES&H) personnel ensures that hazards are adequately evaluated and the necessary controls are identified and implemented prior to the start of work. The ES&H Team, including the LLNL Environmental Analyst, representatives from health and safety</p>

Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site (continued).

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
Prohibit transfer of all or portions of the Facility Property with unmitigated contamination that could cause potential harm under residential or unrestricted land use.	Potential exposure to contaminated environmental media.	disciplines, and the Waste Management Division will also work with the Program proposing the project to determine if the work plans can be modified to move activities outside of areas of contamination. The Livermore Site Federal Facility Agreement (FFA) provides that DOE must comply with the requirements of CERCLA §120(h) if it decides to transfer any of the Facility Property. In the event that a portion or all of the Facility Property is transferred in the future, DOE will implement deed restrictions per CERCLA 120(h), and also will execute a land use covenant at the time of transfer in compliance with Title 22 CCR, Division 4.5, Chapter 39, Section 67391.1. This provision allows California regulatory authorities, either with DOE's concurrence or through administrative process, to designate land as hazardous waste property or border zone property. Local governments are then legally required to include all resultant land use restrictions in their property files. Violations of such restrictions are subject to civil action. California can ease or eliminate covenants upon showing they have completed their purpose. Development will be restricted to industrial land usage. These restrictions will remain in place until and unless a risk assessment is performed in accordance with then current U.S. EPA risk assessment guidance and the DOE, U.S. EPA, DTSC, and RWQCB agree adequately shows that no unacceptable risk for residential or unrestricted land use is present.

Notes:

DOE = United States Department of Energy.

DTSC = California Department of Toxic Substances Control.

LLNL = Lawrence Livermore National Laboratory.

RWQCB = California Regional Water Quality Control Board.

U.S. EPA = United States Environmental Protection Agency.

VOCs = Volatile organic compounds.

Table 2

Table 2. Land Use Control Monitoring Checklist for the Livermore Site

This checklist will be used to conduct monitoring of institutional and engineered controls that are used to prevent exposure to contamination. The checklist will be completed at least annually and the results will be reported in the annual Compliance Monitoring Reports.

Institutional Control	Status ^a	Explanation/Observation of Corrective Action
Verify that the fences and warning signs at the site boundary and control entry are in proper condition. ^b		
Verify that LLNL excavation permit and site evaluation processes are in place and followed.		
Verify that SNL excavation permit and site evaluation processes are in place and followed.		
Verify that the Zone 7 well permitting process is in place and that communication between LLNL and Zone 7 is still in place.		
Verify that the environmental repositories at the Livermore Public Library and the LLNL Discovery Center, as well as the website https://www-envirinfo.llnl.gov/ , are maintained and updated as appropriate.		

Notes:

^a Satisfactory status indicated by "Yes". Unsatisfactory status indicated by "No". Unsatisfactory status requires explanation. The Inspector shall immediately notify the Environmental Restoration Project Leader of any unsatisfactory status.

^b Perimeter fences are inspected by LLNL Security annually.

Inspected by:

(Print Name)

(Signature)

Date:

Appendix 1

Appendix 1 SITE EVALUATION REQUEST FORM (Soil/Asphalt/Concrete)

DATE: _____

TO: _____ DIG PERMIT NUMBER: _____

FROM: _____ PHONE: _____ L-CODE: _____

PROJECT TITLE & LOCATION: _____

PFN: _____ DISPOSAL SITE: _____

SIGNATURE AUTHORITY FOR PROJECT/TASK NUMBER: _____

PROJECT/TASK NO: _____ EMPLOYEE NO: _____

Please evaluate this project for (circle one or more) soil/asphalt/concrete/sampling/surveying needs. A description of the project is attached including project locations, excavation footprint, and depths of excavations. The material (circle one or both) **will/will not** be reused onsite. The planned excavation start date is _____.

The Environmental Functional Area is authorized to use the project/task number above to pay for the costs associated with sampling and analyzing the material to be excavated from the project area. Project/Task charges are not to exceed \$_____ based on your cost estimate, without prior approval.

When sampling/rad surveying is complete, the WAMA Tech will complete the bottom portion of this form and return a copy of the entire form to the originator.

.....

DATE: _____

FROM: _____ PHONE: _____ -CODE: _____

Date rad survey requested: _____ Date rad survey completed: _____

Number of samples taken: _____

Date Samples Submitted for Analyses	Type of Analyses Requested	Lab Performing Analyses	Est. Date Analytical Data Due Back from Lab

Estimated date determination memo provided to Project Manager: _____

cc: _____

Attachment A

ATTACHMENT A

Identification and Screening of Land Use Controls for the Lawrence Livermore National Laboratory Livermore Site

Land Use Controls (“LUCs”) are restrictions or controls that are implemented to protect human health and the environment at a contaminated site. Land use controls include both Institutional Controls (“ICs”), and engineering controls. ICs are a subset of LUCs which EPA (U.S. EPA, 2012) defines as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a response action. ICs are typically designed to work by limiting land or resource use or by providing information that helps modify or guide human behavior at a site. ICs are a subset of land use controls that also include engineering controls and physical barriers. ICs are typically divided into four categories:

1. Proprietary controls.
2. Governmental controls.
3. Enforcement tools.
4. Information devices.

Proprietary controls are generally created pursuant to state law to prohibit activities that may compromise the effectiveness of a remedial action or restrict activities or future resource use that may result in unacceptable risk to human health or the environment. Governmental controls impose restrictions on land use or resource use, using the authority of a government entity. Federal landholding agencies, such as DOE, possess the authority to enforce institutional controls on their property. At active federal facilities, such as the Facility Property, governmental controls may be addressed in master plans, facility construction review processes, and digging permit systems. Enforcement and permit tools are legal tools that limit certain site activities or require the performance of specific activities. Information devices provide information or notifications to local communities about site-related contamination.

LUCs also include engineering controls, such as depressurization systems, capping and containment systems, and security barriers, fencing and security guards, as means to protect human health by containing the hazard and/or preventing exposure to contamination. In this document, the term “LUCs” is used to encompass both ICs and engineering controls.

This section summarizes the remedial action objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs) described in the LLNL Livermore Site Record of Decision (ROD) (U.S. DOE, 1992), and the identification and screening of ICs.

A.1. Remedial Action Objectives

As listed in the LLNL Livermore Site ROD (U.S. DOE, 1992), the cleanup objectives for all contaminants originating at the LLNL Livermore Site are to:

- Prevent future human exposure to contaminated ground water and soil.
- Prevent further migration of contaminants in ground water.
- Reduce contaminant concentrations/activities in ground water to levels below Maximum Contaminant Levels (MCLs).
- Prevent migration in the unsaturated zone of those contaminants that would result in concentrations in ground water above an MCL.
- Meet all discharge standards of existing permits for treated water, and to treat vapor so that there are no measurable atmospheric releases from treatment facilities.

A.2. Applicable or Relevant and Appropriate Requirements (ARARs)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that response actions attain ARARs, unless the decision document justifies a waiver. ARARs include environmental regulations, standards, or criteria promulgated under federal or more stringent state laws. ARARs are chemical-specific, location-specific, or action-specific. ARARs for the Livermore Site are identified in the ROD (U.S. DOE, 1992).

A.3. Identification and Screening of Land Use Controls

This section identifies LUCs capable of achieving the RAOs and screens the LUCs based on applicability, effectiveness, implementability, and cost. Table A-1 presents the LUCs that were identified as being applicable to the Livermore Site. The LUCs evaluated in the screening process included governmental and proprietary controls, informational and enforcement tools, and monitoring. Table A-1 presents the criteria against which each LUC was evaluated. LUCs were either retained or not retained based on judgment of their applicability, effectiveness, implementability, and cost (see Table A-1). The LUCs that passed the screening were retained and combined to form the offsite LUC component of the Livermore Site Remedial Alternatives selected in ROD (Section A.4).

A.4. Institutional Controls Component of the Remedial Alternatives

The following LUCs passed the screening process and were retained as components of the LLNL Livermore Site Remedial Alternative:

- Engineering Controls:
 - Access Control
- Governmental Controls:
 - Alameda County Well Permitting Process
 - LLNL Dig Permit Process
 - Underground Service Alert
 - Restrictions on Well Drilling at Sandia National Laboratory
- Land Record Restrictions:
 - Environmental Restrictive Covenants
 - State Designation of Land as Hazardous Use Property

- Informational Tools:
 - Federal/State/County Site Registries
 - Community Working Group meetings
 - Notification to owners (Near Neighbor Letters)
 - Groundwater Monitoring
- Enforcement Tools:
 - Existing Federal Facility Agreement

These LUCs offer sufficient layering to be protective in the long-term and have been documented in an Explanation of Significant Differences. Table A-2 summarizes the offsite LUC layers.

DOE will implement, maintain, monitor, report on and enforce LUCs for the Facility Property and Sandia Property. DOE will perform those actions related to LUC activities described in this ESD. For the Adjacent Property, DOE will monitor and report on the implementation, maintenance, and enforcement of the LUCs, and coordinate with federal, state, and local governments and owners and occupants of Adjacent Property subject to the LUCs. DOE will provide notice of the groundwater contamination and the LUCs referenced in this ESD to the federal, state and local governments involved at the Site and, as described in subsection 3.2.2.2, the owners and occupants of the properties subject to the use restrictions and LUCs. DOE will provide the initial notice within 90 days of publication of notice of this ESD. Subsequent notifications will be provided on an annual basis or, if conditions warrant, as necessary to ensure protection of human health and the integrity of the remedy. DOE remains responsible for ensuring the remedy remains protective of human health and the environment. DOE will fulfill its responsibility and obligations under CERCLA and the NCP as it implements, maintains, and reviews the selected remedy. Although DOE may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the DOE shall retain ultimate responsibility for remedy integrity.

Attachment A

A-1

TABLE
SCREENING OF INSTITUTIONAL CONTROLS AND MONITORING

GOVERNMENTAL CONTROLS	Controls using the regulatory authority of a governmental entity to impose restrictions on citizens or sites under its jurisdiction. Generally, the Department of Energy (DOE) must turn to state or local governments to establish and enforce controls of this type. Governmental controls include zoning restrictions, ordinances, standards, building permits or other provisions to restrict land use.	Groundwater/VOC	Groundwater/VOC	Soil/VOC	Retained
Alameda County Well Permitting Process	<p>Alameda County Ordinance 6.88.040 prohibits the drilling or alteration of a well in the unincorporated areas in Alameda County, as well as the City of Livermore, without a permit from the Zone 7 Water Agency. Zone 7's mission statement requires it preserve and enhance the environment while complying with regulations. These regulations include California Department of Water Resources' (DWR) California Well Standards (Bullens 74-81 and 74-90). Those standards require all water wells be located an adequate horizontal distance from known or potential sources of pollution and contamination. Zone 7 also maintains a Toxic Sites Surveillance (TSS) Program to document and track release sites within the basin that pose potential threat to drinking water. The information held in this database is used by Zone 7 staff to help assess the potential threat posed by a given site when considering permits and, whenever necessary, to deny a permit application if human health is threatened. Lastly, all well drillers are required to be licensed and file a report of completion (California Water Code 13750.5-13751) with the state. Alameda ordinance requires filing with Zone 7 as well.</p>	<p>Excellent. Drilling a well in Alameda County without a permit is a criminal offense under ordinance section 6.88.070. Alameda County ordinance has been adopted by the City of Livermore, so it applies to all adjoining property owners who could conceivably impact or be impacted by LINS groundwater contamination. Zone 7 has excellent awareness of LINS's contamination issues in relation to other landowners, as reflected in its Toxic Site Surveillance (TSS) Program (latest annual report online at http://www.zone7water.com/images/pdf_dose/water_quality/2012_tss_report.pdf).</p>	<p>Excellent. LLI intends to review the ordinance annually, to ensure it continues to provide protection as it has for over 30 years. LLI will also request Zone 7 to share any information they accrue regarding well drilling with the area tied to LLI's groundwater, and review TSS reports as they are released.</p>	<p>Low. Process exists and is funded already.</p>	<p>Retained.</p>
LLI Dig Permit Process	<p>LLI procedures require a soil excavation permit prior to any onsite well drilling or soil excavation work.</p>	<p>Groundwater/VOC</p>	<p>Good to excellent. As part of the permitting process, the affected plot is evaluated by the LLI Environmental, Safety and Health (ES&H) Team Environmental Analysis (EA) for ground water or soil contamination. If a potential for contaminant exposure is identified, the LLI ES&H Team EA identifies the necessary controls through conditions to the soil excavation permit. Any permit conditions established by the LLI ES&H Team EA are then communicated to the Responsible Individual project manager.</p>	<p>Excellent as the Dig Permit Process is already in place at the LLI Livermore Site.</p>	<p>Retained.</p>
Underground Service Alert	<p>The TFA West pipeline, located underground in the public right-of-way and which transports contaminated groundwater from offsite extraction wells on the Residential Property to the groundwater treatment facilities on the Facility Property, is registered with the Underground Service Alert (USA).</p>	<p>Groundwater/VOC</p>	<p>Good to excellent. California Code 4216 requires that USA be contacted prior to any excavation activities. USA will in turn contact LLI, as the owner of the underground pipeline and LLI is required to mark the location of the pipeline per USA guidelines. Through these mechanisms, the TFA-West pipeline will be adequately identified prior to any excavation activities that could potentially damage the pipeline and result in the release of contaminated groundwater.</p>	<p>Excellent as the pipeline is already registered with USA.</p>	<p>Retained.</p>
Restrictions on Well Drilling at Sandia National Lab (SNL) (DOE)	<p>DOE will incorporate as a condition of the management and operating contract for SNL a provision that DOE will not conduct or authorize well drilling on the Sandia Property for any purpose except environmental monitoring unless and until DOE environmental staff reviews the proposed drilling and determines that it would not adversely impact LLI's remedial actions or create additional risk of exposure to groundwater contamination.</p>	<p>Groundwater/VOC</p>	<p>Good to excellent. The Sandia Property is subject to an internal dig permit process, analogous to the LLI Big Permit Process. DOE will require that the SNL dig permit process incorporate a requirement that the Sandia environmental staff consult the LLI ERD staff if the proposed permit location is near an area of historic groundwater contamination. If it is determined that the proposed water supply well location is in a groundwater contamination area, LLI would work with Sandia to relocate the well to ensure ground water contaminants would not be drawn into the well.</p>	<p>Good. Little to no cost for the DOE to establish the requirement and for LLI to review well locations.</p>	<p>Retained.</p>
LAND RECORD RESTRICTIONS	<p>Controls imposed on future use of individual parcels of land.</p>	<p>Groundwater/VOC</p>	<p>Moderate to good and potentially provides adequate protection from exposure to groundwater plumes over both the long and short-terms. ERCs "run with the land." ERCs to protect LLI's cleanup would also be appropriate in the case DOE ever disposed of SNL-CA</p>	<p>Good. ERCs are easily and routinely imposed by insertion into federal quitclaim deeds that must be prepared anyway in order to transfer the property. Ensuring proper compliance with ERCs can be difficult once the DOE ceases to have a presence at a former lab. Control can only be imposed over property transferred by DOE; no utility for adjoining property owners.</p>	<p>Retained; (applicability limited to DOE property)</p>
Environmental Restrictive Covenants (ERCs)	<p>DOE has the responsibility under the LLI Federal Facility Agreement and CERCLA §120(b), 42 U.S.C. §9620(b) to impose the conditions on transfer of its real property that are necessary to complete its remediation work and ensure safe future use of the land. ERCs may preclude installation of wells, except by LLI, for ground water monitoring or remediation. If properly prepared and recorded, such ERCs "run with the land." ERCs are inserted directly into the DOE quitclaim deed and made binding upon the property recipient through their acceptance of the property by deed. ERCs and associated provisions in a federal deed must be enforced by the federal government in federal court.</p>	<p>Groundwater/VOC</p>	<p>Low. Imposition of ERCs by inserting them in quitclaim deeds generates almost no incremental costs. Long-term implementation would entail some costs. If violations are discovered, enforcement could be costly.</p>	<p>Low. Imposition of ERCs by inserting them in quitclaim deeds generates almost no incremental costs. Long-term implementation would entail some costs. If violations are discovered, enforcement could be costly.</p>	<p>Retained.</p>

TABLE
SCREENING OF INSTITUTIONAL CONTROLS AND MONITORING

State Designation of Land as Hazardous Use Property	Under California law (Health and Safety Code Sections 25222 and 25222.1) California can, with DOE's concurrence or through administrative process, designate land as hazardous waste property or hazardous use property. Local governments are then legally required to include all resultant land use restrictions in their property files. Violation through negotiations with adjoining property owners. DOE would secure their legally binding agreement to accept certain land use restrictions or to refrain from specified activities, where such uses or activities are anticipated to adversely affect protectiveness, blinder cleanup, or open exposure pathways. The RCs in such agreements may preclude installation of wells, except by LNL for ground water monitoring or remediation. If properly prepared and recorded, such RCs would provide information or notification that residual contamination could remain on site. Informational tools include deed notices that rely on property record systems and are used to provide public information about risks from contamination. These are neither governmental nor proprietary controls. They do not directly control potential exposures but are intended as a means of notification and would be available to parties during property transactions (title search). Effectively notify and discourage inappropriate land users from acquiring the property. Examples of other informational tools include federal/state registries, web-based tools, water subseries, periodic newsletters, signs, etc. that do not rely on the property record system. Informational tools could also include public notice requirements (e.g. fact sheets) relating to approval of projects requiring CEQA review which are enforceable.	Groundwater/ VOC Soil/VOC	Moderate to good and potentially provides adequate protection from exposure to residual contamination. Allows state to create or remove restrictive covenants as it sees fit to accommodate changing circumstances, both on former DOE land and adjoining land. State can ease or eliminate covenants upon showing they have completed their purpose.	Good. DOE's existing obligations under CERCLA and the FEA mean there would be no reason for it to fail to give appropriate concern as to its land. In the remote circumstances that adjoining lands are impacted, California can take appropriate action regarding those lands as well.	Administrative costs for DOE land would be minimal. Cost to California for action to restrict adjoining landowners could be substantial.	Retained.
Negotiated Restrictive Covenants (RCs) or "Negative Easements" with adjoining property owners	Through negotiations with adjoining property owners, DOE would secure their legally binding agreement to accept certain land use restrictions or to refrain from specified activities, where such uses or activities are anticipated to adversely affect protectiveness, blinder cleanup, or open exposure pathways. The RCs in such agreements may preclude installation of wells, except by LNL for ground water monitoring or remediation. If properly prepared and recorded, such RCs would provide information or notification that residual contamination could remain on site. Informational tools include deed notices that rely on property record systems and are used to provide public information about risks from contamination. These are neither governmental nor proprietary controls. They do not directly control potential exposures but are intended as a means of notification and would be available to parties during property transactions (title search). Effectively notify and discourage inappropriate land users from acquiring the property. Examples of other informational tools include federal/state registries, web-based tools, water subseries, periodic newsletters, signs, etc. that do not rely on the property record system. Informational tools could also include public notice requirements (e.g. fact sheets) relating to approval of projects requiring CEQA review which are enforceable.	Groundwater/ VOC	Moderate to good and potentially provides adequate protection from exposure to residual contamination. Allows state to create or remove restrictive covenants as it sees fit to accommodate changing circumstances, both on former DOE land and adjoining land. State can ease or eliminate covenants upon showing they have completed their purpose.	Good. DOE's existing obligations under CERCLA and the FEA mean there would be no reason for it to fail to give appropriate concern as to its land. In the remote circumstances that adjoining lands are impacted, California can take appropriate action regarding those lands as well.	Administrative costs for DOE land would be minimal. Cost to California for action to restrict adjoining landowners could be substantial.	Not Retained
INFORMATIONAL TOOLS	Several federal and State data bases exist that contain environmental condition information about parcels of land. Typically, the information is provided to populate the data base through existing requirements and mechanisms. The public can generally access such data bases. The following links are examples of online registry databases that provide data on the search results, including groundwater, based on location entered into the search engine: EPA's CERCLIS: http://www.epa.gov/enviro/factsheet/wells/search.html DTSC's Envirostar: http://www.envirostar.dte.ca.gov/public/ RWOCB's GeoTracker: http://geotracker.waterboards.ca.gov/ LNL's Administrative Record:	Groundwater/ VOC	Good to excellent. The DOE and other regulatory agencies provide information to populate the data bases) in a variety of formats that would allow any individual to identify potential groundwater plume issues for the impacted parcels.	Good. Owner notification only; no agreement or consent. LNL's environmental document repositories are available for viewing at the Livermore Public Library and the LNL Discovery Center.	Low. No cost to the landowner and minimal cost to list and populate the data base. No long term monitoring costs. The existing databases already established support the low cost to implement this control mechanism.	Retained.
Community Working Group (DOE)	Community Working Group (CWG) meetings are held with the general public to brief and engage the public whenever changes to or additions to remedies are proposed or become necessary.	Groundwater/ VOC	Good but limited. CWG meetings provide two-way communication between DOE and the community. The facts of discussions are on the environmental restoration work and related concerns as identified by the community. However, a limited number of property owners choose to get involved with the process.	Good to excellent. CWG meetings are included in the Community Relations Plan for LNL. Site and are held whenever changes to or additions to remedies are proposed or become necessary. Press releases are sent to the local newspapers (The Independent and Valley Times) and are posted on the LNL website. Invite letters are also mailed to doe.assessments@calhhsbdoe.com	Low. No cost to the landowner and minimal cost to announce and hold the meetings.	Retained.
Notification to owners (DOE)	DOE provides notice of groundwater contamination using form letters known as "Near Neighbor Disclosure Letters." These letters are available on the LNL website (https://www.residents.dtl.gov/neighbor.php) and physical copies are mailed to the residences in the area shown on Figure 2 on an annual basis by LNL Public Affairs for any year in which any contamination from the Facility Property exists outside the Facility and Surrounds.	Groundwater/ VOC	Good to excellent because it provides information on both the groundwater contamination and DOE's cleanup with regulatory compliance as well as provides contact information. Redundancy is provided by California real estate disclosure requirements/laws.	Good to excellent. Near Neighbor Disclosure Letters are already in place and have proven effective over time. Modifications to the Community Relations Plan for LNL Site that is dedicated to keeping the public informed on all issues regarding the environmental restoration work.	Moderate cost for mailing to the residences in the area shown on Figure 2 on an annual basis	Retained.
Groundwater Monitoring (DOE)	DOE maintains a Long-term Monitoring Program for its optimized network of monitoring wells as an integral aspect of the remedy. Groundwater data is periodically collected and evaluated to ensure the continued protectiveness of the remedy.	Groundwater/ VOC	Good. A network of both on- and off-site monitoring wells is already in place to detect potential changes in water quality from LNL. Data collected is used to confirm site conditions and update modeling. Able to detect any adverse changing conditions, which would include any physical destruction/damage to DOE infrastructure and/or improper private conduct that adversely impacts or uses the groundwater. Annual and quarterly groundwater monitoring reports are provided to the state and federal regulatory agencies and Zone 7, and are made available to the public. The reports are also incorporated in the Remediation Work Plan.	Good; however, access to privately owned parcels may have to be maintained.	Moderate, especially for the lengths of time involved.	Retained.
ENFORCEMENT TOOLS	Enforcement authority is used to either (1) prohibit a party from using land in certain ways or from carrying out certain activities at a specified property or (2) require the Responsible Parties to put in place some other form of control. Limited, as it is usually binding only on the original signatories of the agreement and does not run with the land. Typical Enforcement Tools include Consent Decree and Administrative Order.	Groundwater/VOC	Excellent. Agreement remains in place and enforceable until LNL cleanup is complete. Transfer of the land does not relieve DOE of its responsibilities.	Excellent. Agreement is in place and working.	No additional costs.	Retained.
Existing Federal Facility Agreement (FEA)	The existing FEA spells out DOE's obligations in detail and provides comprehensive enforcement mechanisms.	Groundwater/VOC	Excellent. Agreement remains in place and enforceable until LNL cleanup is complete. Transfer of the land does not relieve DOE of its responsibilities.	Excellent. Agreement is in place and working.	No additional costs.	Retained.

Attachment A

A-2

Table A-2. Land Use Controls (LUCs) Component of the Remedial Alternative.

<u>Layer #1a – Well Permitting Process (Zone 7 Water Agency, Alameda County)</u>	
<ul style="list-style-type: none"> • Any planned new well construction, soil-boring construction, or well destruction outside the Facility Property must be permitted by Zone 7. <ul style="list-style-type: none"> - Zone 7 would not approve a water-supply well within the impacted area. - Zone 7 maintains a Toxic Sites Surveillance (TSS) Program to track potential threats to drinking water. - All well drillers are required to be licensed and file a report of completion with the state and Zone 7. 	
<u>Layer #1b – LLNL Dig Permit Process</u>	
<ul style="list-style-type: none"> • LLNL procedures require dig permits for all well drilling and excavation activities on Facility Property. <ul style="list-style-type: none"> - The area must be evaluated by the LLNL Environment, Safety and Health (ES&H) Team Environmental Analyst (EA) for contamination. 	
<u>Layer #1c – Restrictions on Well Drilling at Sandia National Laboratory</u>	
<ul style="list-style-type: none"> • SNL procedures require dig permits for all well drilling and excavation activities on Sandia Property. <ul style="list-style-type: none"> - The Sandia Property is subject to an internal dig permit process, analogous to the LLNL Dig Permit Process - DOE will require that the SNL dig permit process incorporate a requirement that the Sandia environmental staff consult the LLNL ERD staff if the proposed permit location is near an area of historic groundwater contamination. - If it is determined that the proposed water supply well location is in a ground water contamination area, LLNL would work with Sandia to relocate the well to ensure ground water contaminants would not be drawn into the well. 	
<u>Layer #2 – Ground Water Monitoring</u>	
<ul style="list-style-type: none"> • The Livermore Site Environmental Restoration Program monitors over 600 ground water monitoring wells to track ground water cleanup progress. <ul style="list-style-type: none"> - The Livermore Site Annual and Quarterly Self-Monitoring Reports contain updates on the status of contaminant plumes and remediation progress at the Livermore Site and data collected from on- and offsite monitor wells. 	
<u>Layer #3 – Land Record Restrictions</u>	
<ul style="list-style-type: none"> • Environmental Restrictive Covenant provides land use restrictions. <ul style="list-style-type: none"> - Livermore Site is restricted to industrial land usage. - DOE will comply with the requirements of CERCLA § 120(h), 42 U.S.C. § 9620(h), in effectuating sale or transfer to impose the conditions on transfer of its real property that are necessary to complete its remediation work and ensure safe future use of the land. - No change in ownership of the Livermore Site will take effect without provision for continued maintenance of any contaminant system, treatment system, monitoring system, or other response action(s) installed or implemented. • State Designation of Land as Hazardous Use Property provides land use restrictions. <ul style="list-style-type: none"> - Allows state to create or remove restrictive covenants as it sees fit to accommodate changing circumstances, both on former DOE land and adjoining land. State can ease or eliminate covenants upon showing they have completed their purpose. - Local governments are legally required to include all resultant land use restrictions in their property files. 	

Table A-2. Land Use Controls (LUCs) Component of the Remedial Alternative (continued).

Layer #4 – Informational Tools
<ul style="list-style-type: none"> • Federal/State/County Site Registries available to the public and containing environmental condition information about parcels of land. <ul style="list-style-type: none"> - LLNL environmental remediation documents are available to the public through the environmental repositories. - Multiple online registries provide cleanup information, including groundwater, based on the location entered into the search engine. • Notification to Owners and Community Working Group Meetings (CWG) <ul style="list-style-type: none"> - DOE periodically holds CWG meetings to discuss the status of contaminant plumes and remediation progress with community members. - Near Neighbor Disclosure Letters discuss the offsite ground water contamination and contact information.
Layer #5 – Existing Federal Facility Agreement (FFA)
<ul style="list-style-type: none"> • Existing FFA spells out DOE's obligations in detail and provides comprehensive enforcement mechanisms <ul style="list-style-type: none"> - Agreement remains in place and enforceable until LLNL cleanup is complete. - Transfer of the land does not relieve DOE of its responsibilities.

Note: Due to the potential for the consumption of offsite ground water contaminated with volatile organic compounds above the Maximum Contaminant Levels, the Department of Energy proposes several layered measures (LUCs) to preclude the completion of a pathway by preventing the installation of a water-supply well.

Attachment B

California State Support Agency Substantive Comments and Responses Considered in Preparing the Explanation of Significant Differences for Institutional Controls, Lawrence Livermore National Laboratory, Livermore Site

Comments from the California Department of Toxic Substances Control

1. Introduction (pg. 1)

Comment: DTSC would like to add the underlined language and delete the crossed out language as indicated:

“The Livermore Site encompasses both the property occupied by LLNL (“Facility Property”) and the property to the ~~south~~ and west adjacent to which is affected, or potentially affected, by contamination from the Facility Property.” It is DTSC’s understanding that the ROD did not include the Sandia National Laboratories, California as part of the “Livermore Site.” DTSC is not aware of any subsequent document that includes the Sandia National Laboratories as part of the “Livermore Site.”

Response: DOE/NNSA intends to retain the questioned language. Consistent with EPA practice, DOE/NNSA is applying the term “site” to refer to both the location from which hazardous substances have been released, as well as locations where hazardous substances have come to be located. DOE/NNSA also recognizes that the Record of Decision applies to contaminants originating from activities at LLNL.

3.2 Description (pg. 6)

Comment: DTSC would like to add the underlined language to the text as indicated:

“Figure 2 depicts a map indicating the geographical location where the LUCs are or will be implemented and maintained.” As written, the text implies that there are no LUCs that are currently in place. The language was added to address this issue.

Response: DOE/NNSA intends to retain the questioned language. DOE/NNSA agrees with DTSC’s opinion that LUCs are currently in place. However, since the LUCs in this document have not been previously included by DOE/NNSA in prior remedy decision documents, it is appropriate to regard them as being implemented for the first time.

3.2.2.3 Control Excavation Activities on Facility Property To Prevent Worker Exposure to Contaminants In Subsurface Soil Until It Can Be Verified That Concentrations Do Not Pose An Exposure Risk To Onsite Workers (pg. 11)

Comment: DTSC would like to add the underlined language to the text as indicated:

“This precludes the possibility of any outside party conducting any soil excavation nor disturbance without DOE/NNSA knowledge and permission. DOE/NNSA will continue to secure and maintain the

fence in accordance with the requirements in Health and Safety Code Section 25359.5.” Table 1 also needs to be revised accordingly.

Response: DOE/NNSA will not include specific reference to Health and Safety Code Section 25359.5 in the ESD or Table 1. While the statute authorizes state and local authorities to direct specific protective fencing measures, EPA advises that it does not create an environmental standard. However, as described in Sections 3.2.2.1 and 3.2.2.3, DOE/NNSA maintains and will maintain fencing which will offer appropriate protection from exposure until cleanup is complete.

3.2.2.4 Prohibit Transfer Of All Or Portions Of The Facility Property With Unmitigated Contamination That Could Cause Potential Harm Under Residential Or Unrestricted Land Use (pg. 12)

Comment: DTSC would like to add the underlined language to the text as indicated:

“In the event that a portion of all of the Facility Property is transferred in the future to a non-federal entity, DOE/NNSA will implement deed restrictions per CERCLA 120(h), and also will execute a land use covenant at the time of transfer in compliance with Title 22 CCR, Division 4.5, Chapter 39, Section 67391.1.” The paragraph continues by stating that DTSC will ensure that a land use covenant is imposed at the time of transfer. In the event that the property is transferred to a federal facility, a land use covenant would not be feasible. The language was modified to address this concern.

“Based on the existing contamination, [d]evelopment will be restricted to industrial land usage.”

Response: DOE/NNSA intends to change the first passage of questioned language as suggested, and retain the second passage of questioned language. As EPA has noted, the second proposed change is redundant. Moreover, it might create ambiguity when compared to the subsequent language containing a commitment in the ESD to prohibit development beyond industrial use until “cleanup levels which allow for unlimited use/unlimited exposure” are achieved.

3.2.3 Livermore Site Land Use Controls Status (pg. 15)

Comment: DTSC would like to add the underlined language and delete the crossed out language as indicated:

“Title 22, California Code of Regulations Section 67391.1~~(a), (d), (e) and (i)~~ require DTSC to ensure that appropriate use limitations are imposed at the time of transfer to a non-federal entity, through a land use covenant on the property to be transferred when hazardous materials, wastes, or substances remain at levels which are not suitable for unrestricted use of the property.” It is DTSC’s position that all of Title 22, California Code of Regulations Section 67391.1 are ARARs and not just subsections (a), (d), (e), and (i).

Response: DOE intends to retain language recommended to be stricken, and include the language recommended for addition. EPA has noted its long term practice of citing sections (a), (d) (e), and (i) of Title 22 California Code of Regulations Section 67391.1 to establish an environmental standard.

DOE/NNSA understands EPA and DTSC have “agreed to disagree” as to the applicability of the remaining sections as ARARs.

8. Acronyms (pg. 19)

Comment: DTSC would like to add the underlined language to the text as indicated:

<u>AEC</u>	<u>Atomic Energy Commission</u>
<u>IRP</u>	<u>Installation Restoration Program</u>
<u>LUC</u>	<u>land use control</u>
<u>NNSA</u>	<u>National Nuclear Security Administration</u>
<u>RAIP</u>	<u>Remedial Action Implementation Plan</u>
<u>SNL</u>	<u>Sandia National Laboratory</u>

Response: DOE/NNSA is including the proposed additions.

3.2.3 Livermore Site Land Use Controls Status (pg. 15)

Comment: DTSC would like to add the underlined language to the text as indicated:

“If the management/operating contractor proposes to change the procedures and protocols, DOE/NNSA will evaluate whether the proposed change is warranted and would affect implementation of the LUCs and, if so, will notify EPA, DTSC, and the RWQCB.”

Response: DOE/NNSA is including the proposed addition.

Comments from the California State Water Resources Control Board

3.2.1 Livermore Site Land Use Control Objectives (pg. 6)

Summary of Comment: Explanation of Soil Gas Issues should be added.

Response: Summary added.

3.2.2.1, Governmental Control, LLNL Dig Permit Process (pg. 7)

Summary of Comment: Clarification of the Dig Permit issuing authority at LLNL was requested.

Response: Requested information has been added.

3.2.2.2 Governmental Control, Alameda County Well Permitting Process (pg. 9)

Summary of Comment: Addition of additional information detailing monitoring data submitted to Zone 7 requested.

Response: Brief description added, with reference to more detailed description elsewhere in the document.

3.2.2.3, Government Control, Dig Permitting Process (pg. 12)

Summary of Comment: Clarification requested on permitting authority and applicability to off-site excavation.

Response: Applicability clarified and limited to on-site. DOE/NNSA regards additional information on soil gas impacts above, in conjunction with Zone 7 well permitting process, as sufficient to resolve concerns about excavation off the Facility Property.

3.2.3, Relevant and Appropriate Requirements (pg. 16)

Summary of Comment: Water Code Section 13307.1, which prohibits state or regional Water Quality Control Boards from considering site closure without a land use restriction in place, is recommended for inclusion as a relevant and appropriate requirement.

Response: DOE/NNSA will not include Water Code Section 13307.1 as a relevant and appropriate requirement in this ESD. DOE/NNSA recognizes the Water Board's responsibilities under Water Code Section 13307.1, and anticipates cooperating with the Water Board to meet those responsibilities when site closure occurs. However, this statute describes the duties of the Boards, rather than creating an environmental standard. Accordingly, EPA has advised that it and the State Water Quality Control Board have "agreed to disagree" as to the applicability of the statute, and it will therefore not be included in this ESD.

